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ADP MASTER PLAN

Volume I

January, 1979

Richard D. Lamm, Governor

Thomas H. Sheehan, Jr., Executive Director

Department of Administration



DEPARTMENT OF ADMINISTRATION

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RICHARD D. LAMM
Governor

December 27, 1978

THOMAS H. SHEEHAN, Jr.
Executive Director

The Honorable Richard D. Lamm
Governor, State of Colorado
State Capitol Building
Denver, Colorado 80203

Dear Governor Lamm:

Attached please find a copy of the 1979 Automated Data Processing (ADP) Master Plan for the State of Colorado.

The 1979 ADP Master Plan was prepared by the Division of ADP in accordance with CRS 24-30-613. It continues the managed growth approach to ADP which was started in 1977. This approach to managed growth includes consolidation of several computer centers, improved data processing services to user agencies, and simultaneous achievement of efficiencies of operation.

The 1979 ADP Master Plan is published in four volumes. Volume I summarizes the overall status of ADP in Colorado and recommends implementation steps for fiscal year 1979-80. Volume II contains the fiscal year 1979-80 budget analysis. Volume III is a report prepared entirely by EDUCOM, an independent consulting organization, which outlines steps to improve data processing in higher education. Volume IV contains the recommendations of a State task force to improve data processing among agencies concerned with the administration of justice within the State.

I ask your endorsement of the 1979 ADP Master Plan and request your permission to continue implementation of the action steps specified.

Sincerely,

Thomas H. Sheehan, Jr.
Executive Director

THS/dsm

Attachments

Governor's Approval

Richard D. Lamm, Governor

Date December 28, 1978



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DEPARTMENT OF ADMINISTRATION

DIVISION OF AUTOMATED DATA PROCESSING

1575 Sherman Street, Room 110
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RICHARD D. LAMM
Governor

THOMAS H. SHEEHAN, Jr.
Executive Director

ROBERT J. MILLER
Director


December 26, 1978

Dr. Thomas H. Sheehan, Jr.
Executive Director
Department of Administration
724 State Services Building
1525 Sherman Street
Denver, Colorado 80203

Dear Dr. Sheehan:

The 1979 Plan for Automated Data Processing for the State of Colorado (in four volumes) was prepared by the Division of ADP for your approval in accordance with CRS 24-30-603. It is an update of the 1978 ADP Master Plan that was approved by you on January 25, 1978 and approved by the Governor on January 26, 1978. The 1979 Master Plan follows the direction that was set by your approval in January. It incorporates the recommendations of the interdepartmental task forces and encourages their continued participation. Most importantly, it is a strategy for the near term that directly relates to the statewide budget requirements for Fiscal Year 1979-80.

Sincerely,


Robert J. Miller
Director

RJM/dp

TABLE OF CONTENTS

	<u>PAGE NUMBER</u>
VOLUME I: THE 1979 ADP MASTER PLAN	
SECTION I: SUMMARY	I-1
SECTION II: ADP POLICIES	II-1
Computer Facilities	II-1
Management and Coordination of Computer Facilities	II-2
Common Systems, State Information and CMIS	II-3
Public Access to Public Records	II-4
Communications	II-5
Resource Justification	II-5
SECTION III: CONSOLIDATED COMPUTER CENTERS	III-1
PART A: GENERAL GOVERNMENT	III-1
Concept	
Present Status	
Fiscal Year 1979-80	
PART B: FINANCIAL MANAGEMENT	III-4
Concept	
Present Status	
Fiscal Year 1979-80	
PART C: HIGHER EDUCATION ADMINISTRATIVE AND ACADEMIC	III-5
Concept	
Present Status	
Fiscal Year 1979-80	
PART D: ADMINISTRATION OF JUSTICE	III-8
Concept	
Present Status	
Fiscal Year 1979-80	
PART E: LABOR AND EMPLOYMENT	III-11
Concept	
Present Status	
Fiscal Year 1979-80	

	<u>PAGE NUMBER</u>
SECTION IV: STATUS OF THE 1978 MASTER PLAN'S RECOMMENDATIONS	IV-1
Computer Facility Direction	IV-1
Standards and Planning Procedures	IV-2
General Government Center	IV-3
Financial Management Center	IV-4
Administration of Justice Center	IV-5
Higher Education	IV-7
Communications	IV-10
SECTION V: STATUS OF ADP EVALUATIONS	V-1
SECTION VI: TECHNOLOGICAL AND OTHER DATA PROCESSING TRENDS	VI-1
Consolidated vs. Distributed Processing	VI-1
Hardware Technology	VI-3
Hardware Reliability	VI-6
Data Processing Industry Trends	VI-6
SECTION VII: STANDARDS	VII-1
SECTION VIII: CONCLUSIONS AND RECOMMENDATIONS	VIII-1
EXHIBITS:	
Exhibit A - Agency and Computer Center ADP Plans	
Exhibit B - Policy Statement - Public Access to Public Records	
Exhibit C - Purpose, Scope and Objectives of Statewide Data Communications Plan	
Exhibit D - Computer Center Data Processing Service Agreement	
Exhibit E - Computer Center Schematic - 20 Existing Centers	
Exhibit F - Hardware and Personnel Cost Trends	
Exhibit G - Computer Center Cost Allocation	
Exhibit H - Major Planned Activities Implementation Diagram	

*VOLUME II: 1979-80 BUDGET ANALYSIS

*VOLUME III: COMPUTING IN COLORADO HIGHER EDUCATION -- A
REVIEW WITH RECOMMENDATIONS

*VOLUME IV: ADMINISTRATION OF JUSTICE TASK FORCE STUDY

*Limited distribution.

Preceding ADP (Automated Data Processing) Master Plans advocated limiting the number of major computing facilities in Colorado State Government because of limited financial resources. Nevertheless, the ADP Master Plans recommended that shared computing facilities support user agencies objectives by providing timely data processing and reports. Implementation of earlier recommendations have proceeded to a point where considerable confidence exists in the validity of previous planning efforts. This report, the 1979 ADP Master Plan for Colorado, extends and refines earlier planning.

STATUS OF ADP MASTER PLANNING

The objectives of the earlier ADP Master Plans represent Phase I of current ADP planning. These objectives include:

- Create a General Government Computer Center. The establishment of this center was outlined in Volume II of the 1978 ADP Master Plan.
- Investigate among user agencies the establishment of an Administration of Justice Computer Center. See Volume IV of the 1979 ADP Master Plan.
- Perform a study of the applications and computing requirements of the Judicial Branch. This study was specified by the Appropriations Act for Fiscal Year 1978-79. See Volume IV of the 1979 ADP Master Plan.
- Continue the operation of a computer center for the Department of Labor and Employment.
- Perform a study of the higher education data processing user community to determine the feasibility of sharing computing resources in both administration and academic computing for its various institutions. See Volume III of the 1979 ADP Master Plan.

These objectives of Phase I of current ADP planning are complete. They represent an ADP statewide budget of \$33 million.

The objectives of Phase II of current ADP planning include:

- Provide each State computer center with adequate hardware and software for the current planning horizon.
- Provide each agency with sufficient funds so that State computer centers can operate efficiently and meet user data processing needs.
- Develop standards, methods, and procedures for improved management of the computing centers.
- Train personnel to use the new systems and resources effectively.
- Evaluate the economic benefits of each proposed change in user agency service requests.
- Prepare a statewide data communications plan during 1979.

The activities in Phase II are now in process.

FY 1979-80

The State ADP Budget recommended for Fiscal Year 1979-80 includes funds for the following:

- Obtain an uninterruptible power supply system to provide backup power for the General Government Computer Center and Administration of Justice Computer Center. These funds were requested by the Office of State Planning and Budgeting.
- Develop a Central Management Information System (CMIS) based on requirements by the State Auditor's Office.

1979



ADP MASTER PLAN

- Transfer the computer processing for the Judicial Branch and Department of Law to the General Government Computer Center.
- Transfer the computer processing for the Department of Corrections to the Administration of Justice Computer Center.
- Provide adequate resources for supporting higher education administrative, instruction, and research processing. Funds for establishing the Higher Education Computing Coordinating Group should be requested early in 1979.
- Provide adequate funds for the Financial Management Computer Center.
- Conduct essential personnel training and development programs.
- Provide distributed processing capability or terminals to identified agencies and establish the necessary communication facilities.
- Eliminate deficiencies in the resources of the Administration of Justice Computer Center.

SUMMARY OF RECOMMENDATIONS

The 1979 ADP Master Plan recommends that the State continue the consolidation and sharing of computing facilities as outlined in the ADP Master Plans of 1977 and 1978 and as revised by interdepartmental studies. Upon completion of such consolidation, the States' computing function will center around five computer centers in the Denver metropolitan area: General Government, Financial Management, Labor and Employment, Administration of Justice, and University of Colorado Medical Center. Each of these centers, as their names imply, will host the processing of functionally related systems and programs.

Outside the metropolitan area, computing facilities will be established to provide data processing services to user agencies whose applications cannot be accommodated by the Denver computer centers.

The applications which are primarily in higher education will be evaluated on user needs, service levels and response times using economic analysis. This procedure will provide an evolutionary process to improve State data processing within availability of funds.

Each computer center should be provided with hardware and software of contemporary technology and sufficient personnel appropriately trained. Appropriate amortization schedules for each computer center should be established. Billing rates for the computation of charges to users should be determined fairly using fully-absorbed cost accounting techniques approved by the Director of ADP and the State Controller.

During the next several years, various agencies will want more integrated systems, common-use systems, and data bases with multi-agency, multi-application purpose. Wherever feasible, the processing of applications that can be integrated will be done by a single computer center. Each computer center management should prepare for the future of integrated systems by strengthening its personnel training, by enhancing its data base management capabilities and by expanding its data communications network.

The Director of ADP will provide definitions, parameters and standards for the State's computerized data communications network.

PREFACE

Annually, an ADP Master Plan is updated in order to reflect new developments and decisions, and to present the short-term objectives for funding and implementation. The ADP policies of the State should remain constant from year to year.

This section sets forth general policies that will be appropriate for continuation over the next several years.

POLICY

Computer
Facilities

The State will move towards maintaining fewer computer centers than it has operated in the past. This reduction can be accomplished by ensuring that each center shares its capabilities with other State agencies.

The States' computers should possess sufficient capacity and sophistication in order to take advantage of the latest technology.

The number, sizes, and locations of the computers will be based upon accepted principles of economic analysis and the level of service requested by the using agencies. Distribution of functions such as data entry or application program processing shall be encouraged. When that distribution is appropriate it should be done with terminals or mini/micro computers rather than through the establishment of separate computing facilities.

The applications to be processed and the necessary service levels must be considered while determining the number, type, and location of computing facilities. Computer software has a wide range of capabilities for the manipulation, association, and assembly of data for multi-information purposes. Whenever practical, applications that support a given function should be processed within a single facility.

The State must develop its personnel resource. As the State moves to fewer centers professional management becomes more important.

There needs to be more than one approach to filling the managerial and technical personnel requirements. The State's career employees must be trained and developed in a more efficient and objective-oriented manner than in the past.

In order to attract highly-qualified new personnel and to offer incentives and career opportunities to the most deserving State employees the entire program for ADP personnel should be improved.

There should be a sharing of computer facilities among requiring agencies. This arrangement should apply to personnel resources as well as to hardware and software.

Funding constraints to support ADP should be expected. In order to cope with this constraint there should be an increased appreciation of the production objectives, capabilities, and limitations within all segments of the ADP community. That knowledge should elicit the cooperation for reciprocal services. Facilities should be shared in order to accommodate peak workloads, to avoid excessive procurement, and to avoid duplication of effort and of capabilities.

Management and
Coordination of
Computer Centers

A director or manager will be appointed for each State Computer Center and will report to the appropriate officer as designated by the executive director, president or chancellor of the department or institution under which the center operates. An advisory committee consisting of representation of interested users will be formed for each State service center. Its purpose will be to advise the manager on matters regarding the operation of the facility.

The Director of the Division of ADP will be responsible for the resources and activities of all centers as outlined in Part 6, Article 30 of Title 24, CRS 1973, as amended.

The budget of each center will be prepared by the manager and submitted to the responsible executive director or college president, after being fully coordinated with each of the agencies that the center supports. A center's budget should be specific as to its request for general or cash funding of each item and should be flexible in its acceptance of either general funds or augmenting revenue to provide the line item services as they may ultimately be appropriated. The Director of ADP will review all of the center's budget requests, as well as those of all supported agencies, and recommend an ADP appropriation for each agency and center and a Statewide ADP budget as part of his annual ADP Master Plan.

Procedures for coordinating the plans and budgets among centers and agencies are contained in the ADP Master Plan. (See Exhibit A.)

Common Systems,
State Information
and CMIS

All future systems requirements should be reviewed to determine their appropriateness for multiple-agency use. (Because of the center's alignments to State functions the reviews can normally be performed by the appropriate center.)

Also, each center should review existing applications to determine if current systems of similar functions can be combined to provide for more than one user. The purpose of pursuing and emphasizing the use of common systems is one of potential savings. The Director of ADP will determine definite common systems to be installed and include them in the next revision of the Master Plan.

Integration of systems and the current project of Central Management Information System (CMIS) will provide significant savings and improved information for many agencies. The Director of ADP and each center director or manager should assist any user in pursuing his recommendations for systems integration and advise and assist the CMIS committee in obtaining its objectives as requested by the committee chairman.

Public Access To
Public Records

Governor Lamm issued an Executive Order, effective August 1, 1978 concerning public access to and privacy of data stored via computers. The order directs that policies and procedures be established to ensure compliance with Article 72 Title 24, CRS 1973, as amended.

The Executive Order provides that the public shall be permitted full access to information, records or data as authorized by the State statutes. The executive director, or the statutorially designated custodian, of the department, division, agency or institution involved shall be the official to whom the public initially directs its request, in writing, for information, records or data. The above designated State official will be responsible for determining whether the requested material constitutes public information, records or data.

The Executive Order states that when the requested public material is contained within a computer system, the State official shall authorize the computer center manager responsible for the requested material to prepare it. The material will be prepared in either hard copy report format, on tape or disk, or other off-line electronic media at the requestors option subject to computer capability.

The access to a computer by a terminal or other on-line mechanism may be granted by agreement and special permission of the Director of the Division of ADP, the Executive Director of the Department of Administration and the executive director of the principal department under whose jurisdiction the records reside. The requestor shall reimburse the State for the appropriate cost of furnishing such material.

The Division of ADP issued a policy statement in compliance with the Governor's Executive Order. It was issued as Section V of Volume I of the State ADP Management Manual. (See Exhibit B.)

Communications

All future communications facilities should be established in anticipation of a statewide network of shared computer centers. A statewide data communications plan will be developed by the Division of ADP. The purpose, scope and objectives of this plan are shown in Exhibit C.

Resource
Justification

All requests for ADP resources must be approved by the Division of ADP. This approval applies equally to requests for new applications and for systems upon which resource requirements are determined (CRS 24-30-603).

Long-range forecasts of ADP resource needs should be made by the Division of ADP, by agencies that operate computer facilities, and by the users of the facilities. The Division of ADP uses the forecasts, via the annual planning process, to inform the users about the future availability of service and the expected costs, and to inform suppliers of the State's intentions.

Short-term and immediate needs are expressed as requests for specific resources, applications or systems. The requests originate with a department, institution, or agency that: one, represents the user or, two, is responsible for providing computer services. The user should originate requests for: applications, remote operations (personnel, equipment and software), and personnel for applications systems analysis and programming. Computer centers should initiate requests for supporting services' facilities, hardware, software and personnel for their operation.

Each request must be justified based upon the life-cycle of the applications and the life-cycle of the resources required to service the applications. Alternative solutions to meet the need, and an economic evaluation of these alternatives should be part of the justification.

The Division of ADP review of requests ensures that all viable alternatives have been considered for the needed services. All existing State resources must first be considered. Where existing State resources are inadequate, commercial sources can then be considered.

INTRODUCTION

The 1978 Master Plan modified and consolidated the recommendations of the 1977 Master Plan. That plan provided substantial benefits by consolidation of some of the State's 21 computer centers. The recommendations proposed that interdepartmental task forces examine consolidation of computing resources within several State processes:

- General Government
- Financial Management
- Administration of Justice
- Higher Education (Administration)
- Higher Education (Academic - Institution and Research)
- Labor and Employment

This section reviews the progress made during the past several years in consolidation of the above six areas and outlines the effort that must be exerted to implement the recommendations.

PART A

GENERAL GOVERNMENT

Concept

The General Financial Management Task Force Study (Volume II of 1978 Master Plan) recommended establishment of two computer centers for the processing of general government applications and financial management applications. The General Government Computer Center was to be established at the Division of ADP computer facility. Computing services for all applications were to be processed at this computer center except for the following programs or agencies:

- Department of Revenue and other financial applications

- The Administration of Justice Program
- The Institutions of Higher Education
- The Department of Labor and Employment

The Department of Social Services Computer Center was to be consolidated with the Division of ADP State Central Computer Center to form the nucleus for the General Government Computer Center.

Present Status

The implementation task force was assigned in February, 1978 and detailed planning for the consolidation began. Software and hardware planning, computer center organization, establishing data privacy standards, developing a users guide, resolving personnel issues, and training of personnel were some of the activities completed by the Task Force.

The General Government Computer Center was established in April, 1978 and a permanent service center manager appointed. The responsibility for the operation of the Department of Social Services Computer Center was transferred to the General Government Computer Center effective July, 1978. The new service center organizational structure became effective on that date.

The mission of the General Government Computer Center is to provide data processing services, assistance and advice to any agency of the State as determined by the Division of ADP. Services rendered include: computer operations, provision of systems software, data communications facilities, and application's systems development and maintenance.

The General Government Computer Center has established the following goals:

Services:

1. Provide improved, continuing data processing support to all users of the former State Central Computer Center in the DADP.

2. Assume computing support for the Department of Social Services (DSS) through consolidation with the DSS Computer Center.
3. Establish responsive rapport with each user; increase the Center's awareness of the user's needs, plans and capabilities, and offer user assistance in planning, budgeting and meeting objectives.

Resources:

4. Replace current computing equipment and software as planned for in the State ADP Master Plan and supported by the Appropriations Act for Fiscal Year 1978-79.
5. Prepare for contingencies that may involve assuming support for new users and applications or relinquishing support to certain present users.

Efficiency:

6. Re-examine and improve operating standards, service levels and procedures; develop a system to manage problems, change, and capabilities that are most responsive to the needs of the users.
7. Provide coordination and support to the Director of ADP through effective planning, early forecasting of needs, coordination of the Center's users, effective fiscal responsiveness, internal evaluation and timely reporting.

Remodeling of the existing facilities to accommodate the additional computer equipment and personnel has been completed. The IBM 3033 was installed during October and the prior computer systems were released. The Department of Social Services Computer Center was closed effective December 8, 1978.

FY 1979-80

The General Government Computer Center budget request includes funds for continuation of on-going applications, planned new applications and processing of Judicial applications to be transferred to the Center.

PART 3

FINANCIAL MANAGEMENT

Concept

The General Financial Management Task Force Study recommended establishment of a Financial Management Computer Center at the present site of the Department of Revenue facility. The existing financial management applications handled by Department of Revenue and the General Government Center were to be handled by this computer center.

Present Status

The Financial Management Computer Center will be established at the Department of Revenue facility during Fiscal Year 1979-80. However, the financial applications from the General Government Computer Center will not be moved to the Financial Management Computer Center initially. Two upgraded IBM 370/145's replaced the basic 370/135/145 systems previously installed. This upgraded equipment was available as a result of replacement of the equipment at the General Government Computer Center and closing down the Department of Social Services Computer Center. The upgraded equipment has adequate capacity to process the Department of Revenue applications for Fiscal Year 1979-80.

It is anticipated that the second processor to be installed at the General Government Computer Center, as recommended by the Administration of Justice Task Force for interim use of the Judicial Branch, could ultimately be used as the processor for the Financial Management Computer Center. In order to obtain the ultimate backup capability and facilitate the transfer of financial applications between the General Government Computer Center and Financial Management Computer Center, both centers should begin to move towards implementation of a common

operating system and communications monitor. This conversion should progress concurrently with the Judicial conversion.

FY 1979-80

The Financial Management Computer Center budget request includes funds for continuing on-going applications and anticipated growth in the volume of processing of those applications.

PART C

HIGHER EDUCATION
ADMINISTRATIVE &
ACADEMIC

Concept

The Higher Education Task Force Study Report (Volume III of 1978 ADP Master Plan) endorsed the concept of a higher education computing consortium with the authority to plan and implement consolidation and networking on a regional basis. It also recommended that public colleges, universities and community/junior colleges join in the consortium.

Present Status

Subsequently, a Request for Proposal (RFP) was issued to a number of consulting firms to make a further study of Higher Education computing needs. The tasks outlined in the RFP to be completed by the successful bidder included:

- Review and critique materials and documents prepared by State agencies to date and comment on validity and the direction proposed for providing computing services to all institutions.
- Interview management of each computer center to assess current status.

- Interview presidents of higher education institutions to assess their views of the present available computing services, their views of the proposed structure, and their ideas on the future scope of computers in their institution and funding thereof.
- Interview users at selected campuses to identify computer service expectations.
- Interview State officials connected with computer related matters in the executive and legislative branches.
- Contact other states or large government entities to determine their direction and success or failure in their endeavors towards consolidation.

The final report was to contain recommendations concerning organizational and administrative structures of the proposed consortium, its feasibility in this State, transition from the current structure to the proposed organizational structure, budget projections, staffing considerations and overall implementation plan. The Director, University of Georgia Office of Computing and Information Services was appointed as Project Director and a consulting firm selected as successful bidder.

In its final report the study team made three groups of recommendations. The first group of recommendations deals with changes in management practices and incentives; the second with the removal of serious deficiencies and the third addresses the governance framework in which computing is most likely to serve effectively.

Those recommendations specifically are:

1. Change the way in which budgeting and funding for computing is organized by (A) reflecting the full cost of computing in all institutions budgets including the amortized value of the capital cost of hardware and (B) funding on a long term basis with carry over from year to year of particular kinds of funds.
2. Provide a non-profit market place for sharing of computing resources among institutions in a way that offers incentives for sharing to both providers and users. Computing services could be purchased from an external source if within the limits of an institutions available computing funds.
3. Replace old, obsolete or inadequate equipment at a number of the institutions.
4. Establish the Higher Education Computing Coordinating Group which would be responsible for coordinating computing in the institutions of higher education. The group would be a small organization of three to five people with an advisory board, and a reporting relationship to and funding through the Department of Administration.

The advisory board would consist of one representative from each institution to be served by the group. The Director or head of the group would be appointed by and report to the Executive Director of the Department of Administration with the advice and consent of the advisory board.

The goal of the Higher Education Computing Coordinating Group would be to balance the need for statewide planning and support of computing with the strongly felt need for user control. It would provide joint planning, budgeting and support among all higher education institutions, but would have no operating

responsibilities. It would work cooperatively with all institutions of higher education in the areas of training and multi-institutional acquisitions of hardware and applications software packages.

If the study recommendations are adopted most computing resources would be operated at the local campus level with opportunities provided to purchase specialized resources from other Colorado institutions, regional computer centers or national networks. The report states that a reasonable expectation for most institutions is that about 80 percent of their demand could be satisfied locally while the remaining 20 percent would be obtained more economically from other sources. Sharing of resources could be on a geographical, governing board or individual institution basis. See Volume III of the 1979 ADP Master Plan.

FY 1979-80

The recommended annual budget for the Higher Education Computing Coordination Group would be from \$160,000 to \$280,000 depending on the size and the scope of activities determined for the group. This budget request will be prepared by the Department of Administration and submitted to the Joint Budget Committee in early 1979.

Changes in institution budget requests resulting from the sharing of resources will not be reflected until the 1980-1981 budget request.

PART D

ADMINISTRATION OF JUSTICE

Concept

The Administration of Justice program includes Law Enforcement, Correctional and Judicial applications. Previously, these applications were associated with Federal and State projects under titles such as Criminal Justice Information System and the Comprehensible Data System. Those projects required integration of data from Law Enforcement, Correctional, and Judicial systems.

The concept is to consolidate the computing services into two computer centers. The first phase consolidates the Department of Corrections applications into the present computer facility at the Colorado Bureau of Investigation to form the Administration of Justice Computer Center. This merger is currently in process. The second phase consolidates the Judicial Branch applications into the General Government Computer Center.

These mergers will place all major justice applications in two computer centers located in the same building. This will facilitate the installation of a data link interfacing between the Judicial applications processed at the General Government Computer Center and other Administration of Justice applications processed at the Administration of Justice Computer Center.

Present Status

The Administration of Justice Computer Center Task Force was established in February, 1978 and was composed of representatives from the Departments of Administration, Institutions, Local Affairs, Corrections, Law, Judicial and the Legislative Drafting Office. The Joint Budget Committee, during the 1978 budget session of the General Assembly, determined that certain economies might be realized by transferring the Judicial Department data processing activities and applications to the Department of Administration.

The Judicial Department requested assistance from the Division of ADP to review their applications and make recommendations for continuance, modifications or deletions of various applications.

The Task Force reviewed all possible alternatives for meeting the data processing needs of the government units involved in the study. They concluded that five alternatives should receive careful attention and analysis. The Committee's final recommendation was to transfer Judicial Department applications to the General Government Computer Center, effective July 1979, where the user applications

would be distributed on two computers during consolidation. Judicial design and programming functions would remain at the Judicial Department which would access the General Government Computer Center through interactive and remote job entry terminals.

The Administration of Justice Computer Center has been established at the Colorado Bureau of Investigation facility. Conversion of Department of Corrections applications for processing at that center are in progress.

A Data Processing Service Agreement has been established between the Administration of Justice Computer Center and the Department of Corrections. (See Exhibit D.) Similar types of agreements should be developed between other computer centers and their major users.

The Department of Institutions should continue their processing during Fiscal Year 1979-80 on the interim system they are currently using. Investigative planning should begin during the year in anticipation of relocating a State owned IBM 370/145 to Pueblo. This processor could be connected to the computer centers in Denver and function as a center for sharing of computing resources.

Planning and coordination efforts should begin during next year between Department of Institutions, University of Southern Colorado and Division of ADP to determine feasibility for consolidating the two Pueblo facilities. If consolidation is determined feasible, an implementation plan will be developed.

FY 1979-80

Supplemental funding for the Judicial Department's data processing division, which was funded for only nine months of operation in the current fiscal year, must be provided early in this Legislative session. This is necessary to continue providing services to Judicial and to facilitate the anticipated transfer of equipment on July 1.

1979



ADP MASTER PLAN

Budget request and appropriation for the Judicial Departments computer equipment, software, contract maintenance and other equipment operating costs should be made to the General Government Computer Center as of July, 1979. The balance of the Judicial Department's data processing budget should be appropriated to the Judicial Branch in accordance with its budget request.

The budget request and appropriations for the Department of Corrections data processing costs should be made to the Administration of Justice Computer Center.

PART E

LABOR AND EMPLOYMENT

Concept

The Labor and Employment Computer Center is funded largely by U.S. Department of Labor funding sources to provide computing support to various Department of Labor programs operated by the State. These include Job Service, Unemployment Insurance, CETA, and a variety of counseling and training programs designed to assist Colorado residents to prepare for and locate useful and satisfying employment.

Computing activities in support of these programs include both computerized automation of service delivery functions and support of program management and long range planning.

Present Status

A large scale computer system and a communications network supporting computer terminals in division offices located across the State are presently installed. A major effort is in progress to automate service delivery functions of the Job Service and Unemployment Insurance programs under national guidelines of the Employment and Training Administration of the U.S. Department of Labor. This major project will be completed during Fiscal Year 1980. Job Matching Systems supporting job placement activities of Job Service Centers and

fully automated processing of unemployment insurance claims as well as collection of employer contributions will be operational statewide via the computer network.

FY 1979-80

As stated above, the U.S. Department of Labor provides the major portion of funds required for the operation of the Labor and Employment Computer Center.

STATUS OF THE 1978 MASTER PLAN'S RECOMMENDATIONS

INTRODUCTION

This plan modifies and consolidates the recommendations of the 1978 ADP Master Plan in addition to making several new recommendations. The changes and the status of the recommendations are contained below. The recommendations are identified by their number in the left margin. The 1979 ADP Master Plan recommendations are underscored, and new numbers have been assigned, as necessary, to the recommendations.

COMPUTER FACILITY
DIRECTION

Recommendation 1

THE STATE SHOULD MOVE IN THE DIRECTION OF SHARING
COMPUTER FACILITIES TO MAXIMIZE ECONOMIC AND SERVICE
BENEFITS.

Recommendation 2

THE STATE SHOULD ESTABLISH NO NEW COMPUTER FACILITIES
UNLESS IT CAN BE DEMONSTRATED THAT THEY PROVIDE UNIQUE
STATEWIDE ECONOMIC AND/OR SERVICE BENEFITS.

Status

Recommendations 1 and 2 have not been modified.

Recommendation 3

THE 21 EXISTING COMPUTER CENTERS SHOULD MAINTAIN
PRESENT SERVICES TO THEIR USERS PENDING THE IMPLE-
MENTATION OF RECOMMENDATIONS IN THIS DOCUMENT WHICH
WOULD AFFECT THEM.

Recommendation 3
(Revised)

This recommendation has been revised as follows:

THE 20 EXISTING COMPUTER CENTERS SHOULD MAINTAIN
PRESENT SERVICES TO THEIR USERS PENDING THE IMPLEMEN-
TATION OF RECOMMENDATIONS IN THIS DOCUMENT WHICH
WOULD AFFECT THEM.

Status

The consolidation of the Department of Social Services Computer Center and Department of Administration Computer Center by establishing the General Government Computer Center resulted in the reduction of number of centers. That number will be further reduced by transfer of Judicial applications to the General Government Computer Center and closing the Judicial Computer Center. (See Exhibit E.)

STANDARDS AND
PLANNING PROCEDURES

Recommendation 4

STANDARD SERVICE LEVELS SHOULD BE USED STATEWIDE IN DEVELOPING COST/BENEFIT ANALYSIS FOR NEW SYSTEMS.

Recommendation 4
(Revised)

This recommendation has been revised as follows:

STANDARD SERVICE LEVELS SHOULD BE DEVELOPED FOR EACH SERVICE CENTER AND SUBMITTED TO THE DIVISION OF ADP FOR APPROVAL. THESE SERVICE LEVELS SHOULD BE USED IN DEVELOPING COST/BENEFIT ANALYSIS FOR NEW SYSTEMS.

Status

Basic service level standards were included in the 1977 Master Plan. Each computer center should develop their own service level standards using these original standards as a guideline. A computer center may have unique requirements that the original standards did not satisfy. The proposed service levels should be submitted to the Division of ADP for approval.

Recommendation 5

ALL DEPARTMENTS, INSTITUTIONS, AND AGENCIES SHOULD FURNISH LONG-RANGE ADP PLANS TO THE DIVISION OF ADP BY APRIL 1 OF EACH YEAR.

Status

This recommendation has not been modified. An "Agency and Computer Center ADP Plans" guide has been issued instructing agencies and computer centers in preparation of plans on an annual basis. (See Exhibit A.)

The following agencies have submitted updated ADP Plans since the 1978 Master Plan was published:

Department of Social Services
 Department of Health
 Department of Natural Resources
 Department of Institutions
 Department of Corrections
 Department of Regulatory Agencies
 Colorado Bureau of Investigation
 Division of Labor
 University of Southern Colorado
 Pikes Peak Community College
 Trinidad Community College
 Community College of Denver
 Colorado State University
 Arapahoe Community College
 Western State College
 Adams State College
 Ft. Lewis College
 University of Colorado (Administration)
 University of Colorado (Academic)

All State institutions of Higher Education were not required to submit updated ADP plans because of the Higher Education Consortium Study that was in process.

The General Government Computer Center submitted a mini-plan in September, 1978. The mini-plan will be developed into a comprehensive plan during the first year of operation of that center.

GENERAL GOVERNMENT
 COMPUTER CENTER

Recommendation 6

A GENERAL GOVERNMENT COMPUTER CENTER (GGCC) SHOULD BE ESTABLISHED AT THE PRESENT DADP FACILITY AND A FINANCIAL MANAGEMENT COMPUTER CENTER (FMCC) SHOULD BE ESTABLISHED AT THE DEPARTMENT OF REVENUE FACILITY

1979



ADP MASTER PLAN

DURING FISCAL YEAR 1978-79. FURTHER, THE DETAILED IMPLEMENTATION PLAN SHOULD BE DEVELOPED BY THE GFM TASK FORCE.

FINANCIAL MANAGEMENT
COMPUTER CENTER

Recommendation 6
(Revised)

A FINANCIAL MANAGEMENT COMPUTER CENTER SHOULD BE ESTABLISHED AT THE DEPARTMENT OF REVENUE FACILITY DURING FISCAL YEAR 1979-80.

Status

The General Government Computer Center was established at the former Division of ADP computer facility in April, 1978. Several months earlier, a Task Force was assigned to perform the activities required for implementation of the recommendations of the study.

The transfer of Department of Social Services applications to the General Government Computer Center was completed in December, 1978. The Department of Revenue computer facility will be designated as the Financial Management Computer Center.

Recommendation 7

THE SELECTED CENTRAL PROCESSORS FOR THE GGCC AND THE FMCC SHOULD BE CAPABLE OF EXECUTING THE CURRENT APPLICATION PROGRAMS WITHOUT PROGRAMMING CHANGES. FURTHER, AN RFP FOR BOTH CENTERS SHOULD BE DEVELOPED AND SUBMITTED TO SUPPLIERS AFTER THE CENTERS ARE ESTABLISHED AND HAVE EXPERIENCED THEIR INITIAL PERIOD OF OPERATIONS.

Recommendation 7
(Revised)

This recommendation has been revised as follows:

THE SELECTED CENTRAL PROCESSORS FOR THE GGCC AND THE FMCC SHOULD BE CAPABLE OF EXECUTING THE CURRENT APPLICATION PROGRAMS. FURTHER, COMPETITIVE PROCUREMENT FOR BOTH CENTERS SHOULD BE DEVELOPED AND SUBMITTED TO SUPPLIERS AFTER THE CENTERS ARE ESTABLISHED AND HAVE EXPERIENCED THEIR INITIAL PERIOD OF OPERATIONS.

Status

Programming changes will not be required in order to process Social Services applications at the General Government Computer Center. The financial management applications presently processed at the General Government Computer Center will not be transferred to the Financial Management Computer Center immediately. Transfer of these applications will require conversion of application programs as they presently utilize different operating systems. Adequate resources are available to continue processing those applications at the General Government Computer Center.

A competitive procurement will be developed and submitted to suppliers during Fiscal Year 1978-79 to provide equipment for both centers. The two upgraded IBM 370/145's moved to the Department of Revenue during the establishment of the General Government Computer Center will provide interim equipment capable of meeting the needs of the Financial Management Computer Center for an indeterminate period of time.

However, the requirements of both centers will be included in the procurement document to preclude the need to issue another later.

ADMINISTRATION OF
JUSTICE COMPUTER
CENTER

Recommendation 8
(Superceded)

A DETAILED STUDY OF THE COMPUTER AND INFORMATION REQUIREMENTS OF THE CBI, JUDICIAL BRANCH, AND DEPARTMENT OF CORRECTIONS SHOULD BE COMPLETED.

Recommendation 9
(Superceded)

AN INTERDEPARTMENTAL TASK FORCE SHOULD DETERMINE THE CBI COMPUTER CENTER'S SUFFICIENCY OR DEFICIENCIES FOR PROCESSING THE ADMINISTRATION OF JUSTICE APPLICATIONS OF THE JUDICIAL BRANCH, THE DEPARTMENT OF LAW, THE DEPARTMENT OF INSTITUTIONS, THE DEPARTMENT

OF CORRECTIONS, AND THE COLORADO BUREAU OF INVESTIGATION. FURTHER, BEGINNING IN FISCAL YEAR 1978-79, THE CBI COMPUTER CENTER, AS THE ADMINISTRATION OF JUSTICE COMPUTER CENTER, SHOULD SUPPORT THE DEPARTMENT OF CORRECTIONS AND THE ADMINISTRATION OF JUSTICE APPLICATIONS THAT ARE CURRENTLY BEING PROCESSED AT THE DEPARTMENT OF INSTITUTIONS COMPUTER CENTER.

The above Administration of Justice recommendations have been modified as follows:

Recommendation 8
(New)

THE PROCESSING FOR THE JUDICIAL BRANCH AND DEPARTMENT OF LAW SHOULD BE TRANSFERRED TO THE GENERAL GOVERNMENT COMPUTER CENTER DURING FISCAL YEAR 1979-80. CONVERSION OF THE JUDICIAL APPLICATION PROGRAMS WOULD BEGIN DURING FOURTH QUARTER, 1979.

Status

The recently completed study of the processing requirements for the Judicial Branch and Department of Law recommended that all applications be processed at the General Government Computer Center beginning in July, 1979, and that the present Judicial Computer Center be discontinued. The conversion of judicial application programs would begin during fourth quarter of 1979 and would be completed approximately 18 months later. See Volume IV of 1979 ADP Master Plan.

Recommendation 9
(New)

THE PROCESSING FOR THE DEPARTMENT OF CORRECTIONS AND DEPARTMENT OF LOCAL AFFAIRS SHOULD BE TRANSFERRED TO THE NEWLY ESTABLISHED ADMINISTRATION OF JUSTICE COMPUTER CENTER.

Status

The Administration of Justice Computer Center was established at the existing Bureau of Investigation Computer Center earlier this year. The computer vendor installed a computer system at an available location to assist in conversion of the Department of Corrections applications and development of new applications. Their personnel are assisting in the conversion of programs, also. See Volume IV of the 1979 ADP Master Plan.

Recommendation 10
(Superceded)

COMMON ADMINISTRATIVE APPLICATIONS FOR ALL COMMUNITY COLLEGES SHOULD BE DEVELOPED AND ADP SUPPORT FOR THE COLLEGES SHOULD BE TRANSFERRED TO A COMPUTER CENTER TO BE DESIGNATED.

Recommendation 11
(Superceded)

THE FEASIBILITY OF COMMON SYSTEMS SHOULD BE STUDIED JOINTLY BY THE TRUSTEES OF STATE COLLEGES, THE UNIVERSITY OF NORTHERN COLORADO, THE COLORADO SCHOOL OF MINES, AND FT. LEWIS COLLEGE.

The above two recommendations have been modified and consolidated into Recommendation 11.

Recommendation 10
(New)

AN UNINTERRUPTIBLE POWER SUPPLY SYSTEM SHOULD BE PURCHASED TO PROVIDE BACKUP POWER FOR THE GENERAL GOVERNMENT COMPUTER CENTER AND ADMINISTRATION OF JUSTICE COMPUTER CENTER.

Status

The Public Service Company power supply is unreliable and will become more unreliable as customer power loads and demands increase. As many as 26 separate power failures occur annually at the GGCC and AJCC location. This results in considerable disruption in service to all users but especially to on-line users that are depending on information from the computer system on a timely basis.

The major portion of all power failures are momentary power surges or dips. Relatively few failures exceed 30 minutes in duration. An uninterruptible power supply system should be purchased that has sufficient batteries to provide up to 30 minutes of continued operation in case of a power failure.

HIGHER EDUCATION

Recommendation 11
(Revised)

THE DIVISION OF ADP IN CONJUNCTION WITH THE INSTITUTIONS OF HIGHER EDUCATION AND THEIR RESPECTIVE BOARDS SHOULD STUDY AND DETERMINE SPECIFIC ADMINISTRATIVE APPLICATIONS FOR COMMON DEVELOPMENT. THE ADMINISTRATION OF THIS EFFORT SHOULD BE APPROPRIATELY FUNDED, AND COORDINATED BY THE DIVISION OF ADP.

Status

The IAI Accounting System was acquired and implemented at the General Government Computer Center for use by all community colleges. Community College of Denver, Arapahoe Community College and Pikes Peak Community College are in the process of implementing this accounting system.

A task force of representatives from State institutions of higher education has been appointed by the APCUP to study the full range of automated library systems. The task force should complete the study as quickly as possible and make their recommendations.

However, a Library Circulation Control System was implemented at the Auraria Higher Education Center during the past year and operated by the University of Colorado at Denver. The University of Colorado Medical Center, Pikes Peak Community College and Community College of Denver (Red Rocks and North campuses) plan to implement this library system as soon as funds are available. All institutions of higher education should study this system for applicability in the institutional library. The planning, funding and equipment requirements should be coordinated with the Division of ADP.

The central personnel system is being modified to meet some of the requirements of Metropolitan State College. This modified system may be extended to other State institutions of higher education if successful at Metropolitan State College.

The concept of systems sharing has always been in existence in higher education but should be encouraged since modification of an existing system is normally significantly less costly than developing a new system.

Recommendation 12
(Superceded)

THE HIGHER EDUCATION TASK FORCE SHOULD CONTINUE ITS STUDIES AS IT HAS PROPOSED. FURTHER, THE TASK FORCE'S RECOMMENDATIONS CONCERNING GOVERNANCE, REGIONALIZATION, AND FUNDING SHOULD BE PROVIDED TO THE HIGHER EDUCATION STEERING COMMITTEE BY JUNE 30, 1978.

Recommendation 12
(New)

THE RECOMMENDATIONS OF THE HIGHER EDUCATION CONSORTIUM STUDY CONCERNING ORGANIZATION AND FUNDING OF DATA PROCESSING COORDINATION SHOULD BE IMPLEMENTED BEGINNING IN JULY, 1979.

Status

The Higher Education Consortium Study report recommended establishing a Higher Education Computing Coordinating Group. The group would be responsible for coordinating computing in the institutions of higher education. It would consist of a small organization of 3-5 people who would work cooperatively with all institutions in the areas of planning, budgeting, training and multi-institutional acquisitions of hardware and applications software packages.

The report also recommended changing the way in which budgeting and funding for computing is organized; providing a non-profit market place for sharing of computing resources; and replacement of old, obsolete and inadequate equipment at a number of institutions. See Volume III of 1979 ADP Master Plan.

Recommendation 13
(New)

BUDGET REQUIREMENTS TO SUPPORT THE RECOMMENDATIONS OF THE HIGHER EDUCATION CONSORTIUM STUDY SHOULD BE PREPARED BY THE DEPARTMENT OF ADMINISTRATION AND SUBMITTED TO THE JOINT BUDGET COMMITTEE IN EARLY 1979.

Status

The study report estimated an annual budget of \$160,000 to \$280,000, would be required to support the Higher Education Computing Coordinating Group depending on the size and the scope of activities determined for the group. The Department of Administration should submit a budget request to the Joint Budget Committee early in 1979 to provide the required funds. Funds to support other recommendations that were not included in the 1979-80 budget request will be requested in subsequent budgets.

COMMUNICATIONS

Recommendation 14

A DETAILED STUDY OF THE DATA COMMUNICATIONS REQUIREMENTS OF STATE AGENCIES AND INSTITUTIONS OF HIGHER EDUCATION SHOULD BE MADE AND A STATEWIDE DATA COMMUNICATIONS PLAN DEVELOPED BY THE DIVISION OF ADP.

Status

As the concepts of data base and distributed processing have evolved, similar conceptual improvements have occurred in the world of data communications and related networks. A minimal number of data communication improvements have been implemented independently by State computer centers, but little effort has been expended in statewide data communications. The statewide data communication plan is intended to address statewide data communication problems and provide cost-effective solutions and recommendations to these problems.

Today there exists the need for terminals to access several State computer centers: data circuit access paths between central data bases and distributed processors and their attached terminals; and the elimination of duplicate data circuits currently utilized by independent computer centers. In addition, the bulk acquisition of data circuits on a statewide basis would result in reduced costs for State computer centers. Exhibit C defines the purpose, scope and objectives of the statewide data communications plan.

PREFACE

Developing and maintaining the ADP Master Plan is a continuous activity that requires a great amount of information from all departments, institutions, and agencies. Much of that information can be and is collected from the agencies in the form of their plans, budget requests, resource justifications, project evaluation sheets, etc. The agencies' documentation alone, however, cannot assure that the State is meeting the ADP needs of each agency -- direct contact with the agencies is essential.

One of the most important of the on-site contacts is the ADP performance evaluation; this is one of the contact's in which a sufficient length of time is allocated for an overall look at an agency's ADP needs and capabilities. The evaluation reports are provided to the Governor and the General Assembly for information as well as to agency management for appropriate action and follow-up.

The most obvious problem with the performance evaluation program is the frequency with which they can be conducted at any one agency. With current Division of ADP personnel resources, an agency can be evaluated only once in seven years. Until this situation is remedied, all agencies should be as thorough as possible in their preparation of ADP plans (see Exhibit A) and other required documentation.

ADP evaluations are discussed in this section to promote a better appreciation of the evaluation program among the agencies, executives, and the General Assembly, and to demonstrate the importance of the evaluations in the planning effort.

AUTHORITY

ADP Performance Evaluations are conducted in accordance with the below quoted statutes of CRS 1973, as amended;

24-30-102(1)(a)

"Study and make recommendations to the Governor regarding improvements in techniques used by State agencies for management specialties, including, but not limited to, . . . data processing management."

24-30-603(1)(j)

"Continually study and assess the data processing operations and needs of State departments, institutions, and agencies."

SCOPE

The ADP Performance Evaluation assesses the data processing activities of an agency or institution including:

- applications,
- utilization of resources, personnel and equipment,
- plans and forecasts,
- user information needs,
- controls, and
- management of the operation.

SCHEDULE

Evaluations were conducted at 16 operating activities during the past five years. During Fiscal Year 1977-78 evaluations were completed at the University of Colorado and Adams State College. Within these two evaluations, 90 recommendations were made for improvement of the ADP operations. Agency responses to the recommendations indicated concurrence with 83 and a commitment to begin immediate implementation. Copies of the evaluations are available at the agency or at the Division of ADP.

During 1978-79, evaluations will be conducted at Fort Lewis College and Mesa College. In addition, follow-up evaluations will be conducted for the University of Northern Colorado and the Colorado Bureau of Investigation. Follow-up reviews will be completed for:

- Colorado State University
- University of Southern Colorado
- Western State College
- University of Colorado
- Adams State College
- Department of Health

In Fiscal Year 1979-80, evaluations are scheduled for the General Government Computer Center and the community colleges at Trinidad, La Junta, and Lamar.

With the existing staff, the Division of ADP conducts evaluations of all agencies within a seven year cycle. Prior emphasis has been on utilization of equipment and operational effectiveness of the facilities. Future evaluations will continue to address these matters. However, additional emphasis will be placed on systems effectiveness, and utilization of ADP personnel.

Results

The evaluations provide the Division of ADP, the Legislature and other interested parties with the status, problems and plans for ADP within the State agencies and institutions. This information is used by the Division of ADP in developing budget recommendations, assessing equipment acquisition requests and developing the State of Colorado Master Plan.

The evaluation team is able to determine the effectiveness of automated systems from the users' point of view. This determination is communicated to the ADP organization and top management with recommendations for improvement. Changes to systems are made in accordance with these recommendations.

In those agencies where user involvement in systems development and priority setting has been lacking, the recommendations have led to the reactivation or initial establishment of user advisory committees. This group improves effectiveness of systems and the aligning of resources to agency goals and priorities. Policy and Advisory Committees are being established at the various campuses of the University of Colorado as a result of the evaluation teams' recommendations. Adams State College has established an ADP/Computing Planning and Control Committee upon recommendation of the evaluation team.

The evaluations stimulate the establishment of uniform standards and the upgrading of programming, systems and user documentation. The University of Colorado is reviewing their user manuals with a view to simplification where feasible and beneficial. The establishment of due dates, checkpoints and milestones for all projects is encouraged in order to assure more effective use of personnel.

Numerous operational improvements have been made in computer centers as a result of recommendations of the evaluation team.

As part of the evaluation, the utilization of equipment is analyzed. The Division of ADP purchased a TESTDATA hardware monitor to be utilized in computer performance measurement. This device measures utilization of the various computer components. In addition, it measures individual usage of various features of each of these components.

Performance improvement is not a new discipline in the data processing industry. Systems programmers have been improving the performance of computer systems for many years. Their primary technique has been insight. They intuitively identify areas of inefficiencies relying sometimes on basic performance evaluation tools to clarify the extent and effect of the problem. The hardware monitor provides a tool that will measure the time utilization of a system.

The evaluation team has used the hardware monitor to measure system performance on a number of occasions. It has been used in conjunction with performance audits; to assess workload on systems approaching their maximum processing capacity, to isolate hardware and software failures which were causing system degradation, and to balance utilization of channels and devices on a system.

CONSOLIDATION VS.
DISTRIBUTED
PROCESSING

Many changes have occurred in data processing during the past 30 years. The industry at that time utilized electronic accounting machines (EAM) which required all data to be recorded in the medium of punched holes in cards. It was then processed on tabulators, card sorters, card reproducers, etc. Only basic applications were automated by the equipment.

The first general purpose computer systems were installed in the early 1950's. Although they were very limited with a minimum number of characters (bytes) of memory, very slow tape drives, virtually no disk drives, they performed the basic functions of computers as we know them today. Since they were basic small computer systems, each user that could afford the tremendous cost had their own self-contained system. Data communications had not been developed.

Usually processing was a simple batch approach with cards read in, processing taking place and cards punched or reports printed. Most applications such as payroll and personnel, were easy to understand, easy to implement and the hardware was relatively simple to work with. As applications grew and new ones were developed additional hardware was installed.

In some cases there was a system for each application. As the number of these systems began to grow, however, so did the difficulty of interfacing between them. There were problems of redundancy in hardware, software and personnel. Control became an increasing burden.

Along with the growth of data processing applications, however, came technological developments that improved price/performance and system capacity. The IBM System/360, and Univac 1100 Series were examples of a generalized computing facility, a family of computers, ranging from small to large. It represented a systems architecture for the batch processing environment of the day that could protect the users programming investment. It allowed the user to write application programs for a small system and as requirements grew to move these applications to more powerful systems with little or no change in application programs.

As larger, more economical computers became available, the data processing community began to move toward integration and consolidation of computing. Data base capabilities provided the means not only to eliminate redundancy but also to begin to tie all the pieces of information together into a valuable reservoir of information. Additional users began accessing each of these data bases.

Consolidation of State computer centers over the past several years has been due to the superior capability and the economies of scale which large systems offer, their ability to interrelate total organization data through large data management facilities and the availability of a wide variety of system services to many locations. These kinds of advantages are even more widely recognized now, and there is no question that the need for a number of large central systems will continue to grow in the years ahead.

At the same time, however, there is emerging a need for smaller data base systems at selected locations throughout the State as enhancements to current systems plans. These smaller systems are being used to solve the need to manage and use local data, answering the operational needs of local management and also acting as sub-host processors to larger central systems.

Distributed processing allows the user to take advantage of the reservoir of information at the central site while "off loading" the central computer by moving some of the processing workload to those locations where it may more logically and economically belong. Distributed processing provides a balanced approach: necessary control at the central location along with new flexibility for the end user.

The primary goal of distributed processing is to obtain improved service at lower cost through resource sharing. The concept of using mini-computers and special purpose computers is to place processing power at points where the data is generated or where the data is needed for supervision or management.

It is no longer economically feasible for each major user to have their own standalone central processor as they did in the 1960's with the small standalone systems. Distributed processing provides users with the advantages of standalone systems but yet giving them easy access to large data files, extensive computer power and the numerous other advantages of processing at a central site.

HARDWARE TECHNOLOGY

The internal processing speed of computer mainframes has increased tremendously. They operate at speeds which we can scarcely comprehend, and they keep getting faster as miniaturization techniques reduce the distance between the computer's components to ultra-microscopic dimensions. Following is a comparison of those speeds:

<u>CIRCA</u>	<u>TYPICAL COMPUTER OPERATING SPEED</u>	<u>FRACTION OF A SECOND</u>
1950's	MILLISECOND	1/1,000
1960's	MICROSECOND	1/1,000,000
1970's	NANOSECOND	1/1,000,000,000
1980's	PICOSECOND	1/1,000,000,000,000

To give more meaning to these speeds...

... There are as many NANOSECONDS in one second as there are seconds in over 31 years.

... There are as many PICOSECONDS in one second as there are seconds in 31,710 years.

Computer power is continually getting cheaper. Today's computer in term of its power equivalent costs less than 1% of its 1960 counterpart. A computer job that might have cost \$10,000 in 1960 would cost approximately \$100 today. The same job will cost approximately \$20 to process by 1985. Computers are compact and getting even smaller. A computer which filled a large room in 1960 can now be placed on and operated from a small desk.¹

Mr. Vico Henriques, President of Computer Business Equipment Manufacturers Association, speaking before the National Association of State Information Systems 1978 annual conference stated "If technology in the auto industry had progressed as much since 1960 as it has in the computer industry during that period, you could purchase a Rolls Royce today for 4¢ and would get 1,000,000 miles per gallon of gasoline."

In contrast to the pace of innovation elsewhere computer printing technology until recently has been remarkably stable. But significant change is underway. For example, non-impact printing technologies have already appeared in products like the IBM 3800, the Xerox 9700 and the Honeywell Page Printer. The main virtue of these so far has been high speed. They use the concepts of laser drum transfer, copier drum transfer or direct imaging. These technologies are complex because they are not constrained to a single font as impact printers are; any characters of any size, any graphic image, any logo, any color if needed, are all available.

In economic terms, with the cost of computers decreasing, paper prices increasing and conventional printout hardware achieving only modest price reductions, the printout function assumes new prominence as a cost element in the total system budget.

It is projected that the computer printed output volume will more than double during the next 10 years. There will probably be no increase in impact printer speed in the future. The technology of a mechanical print device does not lend itself to increasing the speeds much above that of existing products on the market.

Cost of printing supplies (especially paper) will continue to increase resulting in:

1. More data compaction
2. Printing on both sides of the page
3. More system control

4. Continued reduction in operator intervention
5. More flexibility (i.e., changing fonts and character sizes on same page, etc.)
6. Further cost performance improvement.

Computer output microfilm, as discussed in the 1978 Master Plan, is another means of reducing computer printer volumes.

Data base applications require large amounts of data available with minimal access time, this results in the file storage system becoming much more critical. There are new technologies being developed for file storage such as charge coupled devices, magnetic bubbles, electronic beams and holograms. However, new models in magnetic disk systems are also under development. It appears that the present packing density of data on a disk can be increased by perhaps a factor of ten. A 400 MB 3350 type spindle which is the state of the art today, might contain four billion bytes in the future. Thus, the unit cost of disk storage will become very low, and the new technologies mentioned above are not going to be able to match the cost for at least ten years. The disc will remain the file storage medium of choice for the near future.

However, that means the access arms still have to be moved and this is a slow process. Fortunately, the arm movement problem can be solved by providing a large fast buffer store and employing the same principle utilized in cache memory. Cache memory operates on the concept that after an item is referenced there is an 80% chance that the next item wanted will be within the next four records. If four or more records are brought into a large buffer at each read, the next one needed will be in the buffer and the disc arm need not be moved except for every third or fourth reference. Buffered disk systems with intelligent controllers that manage the device complex as if it were all a homogenous file will likely be offered by a number of vendors.²

HARDWARE RELIABILITY

One result of State governments' dependence on data processing for its operation will be an increasingly stringent demand for reliability and availability of data processing capabilities. Hardware reliability will improve because of the inherent characteristics of the technology, architectural changes, and increased sophistication of the maintenance process. Emphasis will be on the availability of the entire data processing system. Installations must assign a higher priority to reliability and availability. It is expected that some of the future hardware cost/performance improvements will be used to overcome the current shortfall in hardware reliability.

Redundancy may be the route to better availability. Some vendors may provide redundancy by designing a computer with three of every circuit and hardware logic for a majority vote on every function performed. If one circuit is out of step with the other two, the logic accepts the answer from the two and assumes that the third circuit failed. Other vendors offer an option of fail-softness through a continuous diagnostic procedure.³

Catastrophe prevention measures and recovery capabilities become essential as data processing is integrated into the main line of State government. Proposed hardware and software changes will be scrutinized carefully, certainly by the center manager and in some cases by the end user for impact on service, even if the changes promise substantial economics.

DATA PROCESSING
INDUSTRY TRENDS

The data processing industry will continue to double in dollar volume every five years worldwide from 1975 to 1990.

Total user spending on data processing in the United States will increase from 2.1% of the Gross National Product (GNP) in 1970 to 13% in 1990 and from \$101. per capita to \$1,253.

As many as one in five of the United States labor force will require some knowledge of data processing by 1990. In addition, more than six out of ten in the United States labor force will depend in some way on data processing by that date. A larger and larger percentage of the cost of data processing will be attributable to personnel costs perhaps making data processing the nations most labor intensive field.⁴ (See Exhibit F.)

This increase in personnel cost emphasizes the need for the State to strengthen its ability to continually update the skills of its personnel and educate them in the rapidly changing tools and techniques that will be required of data processing professionals in an equally rapidly changing environment.

One method of increasing the knowledge of our data processors is their increased professional involvement in user groups, professional societies, standards activities, etc. (i.e., SHARE INC., GUIDE INTERNATIONAL, ACM, DPMA, etc.).

INTRODUCTION

This section contains only those cost and performance standards which are pertinent to the Master Plan, support its objectives and recommendations and are proposed for adoption statewide. Currently adopted standards are published in the State Automated Data Processing Management Manual.

OBJECTIVE

The objective is to establish standards for ADP management, planning, applications development, equipment management, and performance evaluations. The standards should specify levels of service which should be provided by computer centers to their customers in order for them to receive the necessary support for their programs at reasonable cost. Such standards will provide consistency in the review of budgets and resource acquisition requests.

CURRENT STATUS

The State ADP Management Manual is organized in seven volumes:

<u>Volume</u>	<u>Title</u>
One	<u>ADP Administration</u> Includes statutes, executive orders, policy, agency planning, statewide planning, Federal Information Processing Standards, and security.
Two	<u>ADP Financial Management</u> Includes budget analysis, project analysis, and other financial standards.
Three	<u>ADP Applications Management</u> Includes standards to assure quality through the various stages of design, implementation, and post implementation evaluation.
Four	<u>ADP Personnel Management</u> Includes training of ADP personnel.

<u>Volume</u>	<u>Title</u>
Five	<u>ADP Equipment Management</u> Includes acquisition procedures.
Six	<u>ADP Facilities Management</u> (To be published.)
Seven	<u>ADP Evaluations</u> (To be published.)

The use of these standards provides certain advantages:

1. Easier transferability of systems between agencies,
2. Better communications between agencies, and
3. Reduced effort in maintaining various systems manuals.

Recommendations for revisions or new standards should be submitted to the Division of ADP.

Standards for the preparation of agency and computer center ADP plans are contained in Exhibit A.

STANDARD SERVICE LEVELS

The following performance standards were published in the 1977 Master Plan. They should be used pending recommendations from interdepartmental task forces or directors of each computer center.

- Prime Shift - 8:00 a.m. to 5:00 p.m. (95% reliability)

Priority 1 - On-line (interactive) applications where full-time operators are employed whose high productivity would be lost by poor response time (less than 5 seconds).

- Priority 2 - On-line inquiry applications where citizen information is being retrieved for agency and/or citizen inquiry and interactive program development (less than 10 seconds).
- Priority 3 - On-line inquiry applications for management information (less than 20 seconds).
- Priority 4 - Remote and local batch production jobs that require prime shift processing (1 hour plus processing time).
- Priority 5 - Inquiry by counsellors, auditors, etc., for conduct of daily business (less than 45 seconds).
- Priority 6 - Remote and Local Student Batch Jobs
- Students in beginning courses (less than 15 minutes).
 - Students in advanced courses (less than 1 hour).
- Priority 7 - Remote and local batch program compiles and tests (less than 1 hour plus processing time, with 90% reliability. More than 1 hour increases programming labor costs).
- Second and Third Shifts (99% reliability)
- Priority 1 - All on-line (interactive) processing with the same response time as prime shifts.
- Priority 2 - All regularly scheduled batch production jobs - by 8:00 a.m.
- Priority 3 - Research oriented jobs - by 8:00 a.m.

FISCAL STANDARDS - CHARGING ALGORITHM'S

A standard method of charging for services by computer centers is to be published as part of the State ADP Management Manual. The standard will require each computer center to establish cost centers as follows:

- Systems Analysis
- Programming
- Data Entry
- Computer
- Others (as appropriate to an individual center and as approved by the DADP)

All indirect as well as direct costs for the operation of a cost center will be recovered through the use of a standard charging algorithm. The algorithm will include the total cost of operating the center as determined by the appropriation, the costs of each activity (including indirect or general services), the allocation of all activities costs to cost centers, definition and estimates of units of work for each cost center, and calculation of a billing rate for each unit of work.

Personnel costs used in the algorithm shall include all "potted" funds.

Costs of "capital" items will be recovered by amortizing the cost over the appropriate estimated life of the asset recommended by the computer center and approved by the DADP. Estimated salvage value at the end of the estimated life should be considered also. Procedures for reporting the amortization of capital items will be included in the ADP Management Manual.

A computer center may establish variable rates for a service for such things as special turn-around times, preferred shift or processing times, or extended use of storage media. In such cases, a computer center must illustrate its ability to account for the additional work unit measurement.

Exhibit G is an illustration of the form on which a computer center shall calculate its billing rates and obtain the approval of the DADP. Rates should be calculated so as to be valid for a full fiscal year. When variances occur in excess of + 5% at the end of the fiscal quarter, rates should be adjusted to correct the variance. The Division of ADP will provide assistance in developing billing algorithms to any computer center requesting it.

FUTURE STANDARDS

Standards for the consolidated centers proposed by the Master Plan will be developed out of the proposals of the interdepartmental task forces, as each center is activated.

Additional standards will be developed, as necessary, to provide for user agency participation in such things as the selection of hardware or software for the center.

Insofar as possible, however, the standards should be applied statewide, and not just center by center. The State ADP Management Manual provides an open-ended vehicle for this purpose, and should be utilized.

CONCLUSIONS AND RECOMMENDATIONS

PREFACE

The primary purpose of this 1979 Master Plan is to set the direction for Fiscal Year 1979-80. Therefore, this section concentrates on activities and objectives for the budget request year.

CONCLUSIONS

The recommendations of the 1978 ADP Master Plan, as approved by the Governor, should continue to be pursued. These recommendations are updated as indicated in Section IV. Exhibit H depicts a proposed implementation schedule for these recommendations and activities.

The recommendations of the 1978 ADP Master Plan as revised by this plan and the new recommendations submitted should be implemented during Fiscal Year 1979-80. These are:

- Recommendation 6 - Establish a Financial Management Computer Center at the Department of Revenue facility.

The financial applications presently processed at the General Government Computer Center will not be transferred to that facility immediately. However, all new financial applications will be implemented at the new Financial Management Computer Center.

- Recommendation 8 (new) - Transfer of processing for the Judicial Branch and Department of Law to the General Government Computer Center.

The computer and information requirements have been investigated by an interdepartmental task force that recommends transfer of the applications presently processed at the Judicial Center to the General Government Computer Center.

- Recommendation 9 (new) - Transfer of processing for Department of Corrections and Department of Local Affairs to newly established Administration of Justice Computer Center.

1979



ADP MASTER PLAN

The Administration of Justice Computer Center has been established and the conversion of applications for the Department of Corrections is presently in process.

- Recommendation 10 (new) - Provide an uninterruptible power supply system for General Government Computer Center and Administration of Justice Computer Center.

In order to improve the reliability and availability of computer processing service at the General Government Computer Center and Administration of Justice Computer Center, it is recommended that an uninterruptible power supply system be obtained to serve both centers.

- Recommendation 11 (on-going) - Study and determine specific administrative applications for common development by institutions of higher education and Division of ADP.

This recommendation which was made in the 1978 Plan applying to specific colleges has been expanded to apply to all higher education institutions.

- Recommendation 12 (new) - Implement recommendations of the Higher Education Consortium Study Group in July, 1979.

The Higher Education Computing Coordinating Group should be established and the other recommendations and resulting decisions of the study implemented as soon as feasible.

- Recommendation 13 (new) - The Department of Administration should submit a budget request to the Joint Budget Committee early in 1979 to support the recommendations and resulting decisions of the Higher Education Consortium Study

Funds should be requested early in 1979 to establish the Higher Education Computing Coordinating Group. Replacement of some of the obsolete equipment is included in the budget request. Funds required to implement other recommendations of the study will be requested in subsequent budgets.

- Recommendation 14 (new) - Study the data communications requirements of State agencies and institutions of higher education and develop a statewide data communications plan.

Various State agencies and institutions have developed data communications networks to meet their own individual needs. A detailed study of data communication requirements of State agencies and institutions of higher education will be made by the Division of ADP in conjunction with representatives of those agencies and institutions and a statewide data communications plan developed.

RECOMMENDATION

It is recommended that the implementation activities described in the conclusions above be approved, and that sufficient funds be appropriated in Fiscal Year 1979-80 for their accomplishment.



NOTES

¹Robert Weathers, "Computers - Their Promises, Pitfalls and Passions," Intergovernmental Board on Electronic Data Processing, Sacramento, California, 1977, p. 3.

²Frederic G. Withington, "IBM's Future Large Computers," Datamation, July, 1978, p. 116.

³Ibid.

⁴Pender H. McCarter, "Where Is The Industry Going," Datamation, February, 1978, p. 99.

1979



ADP MASTER PLAN

Agency and Computer Center ADP Plans

This procedure was developed to provide a consistent format for agencies to use in preparing their annual ADP Plans. It also provides a consistent format for computer centers that service these agencies to follow in submitting their Center's annual ADP Plans.

AGENCY AND COMPUTER CENTER ADP PLANS

The occurrence of consolidation of computer centers indicates a need to revise the previous concept of agency ADP planning. In the past, each agency planned, almost independently, for its own ADP support and submitted its plans directly to the Division of ADP. In the future, more coordinated planning among an agency and its supporting computer centers will be increasingly appropriate.

Beginning in calendar year 1979, the Division of ADP will require an agency ADP plan from each of the agencies listed in TAB 1. The agencies' plans must be received by April 1 and must contain the information indicated in "Format for Agency Plan," below. The Division of ADP will provide the appropriate agency plans and coordinating instructions to the manager of each supporting center by April 30. Subsequently, each supporting computer center listed in TAB 2 will prepare a computer center plan. The computer center plan must contain the information indicated in "Format for Computer Center Plans," below, and will be provided to the Division of ADP by June 15.

The objectives of the above schedule are:

1. To allow for adequate planning and dissemination of agency and computer center plans prior to preparation of budget requests.
2. To provide time to the Division of ADP to formulate the ADP Master Plan and budget recommendations for the Governor, the Office of State Planning and Budgeting and the Joint Budget Committee.

FORMAT FOR AGENCY PLANS

SECTION I: Management Summary

SECTION II: Current Status

- Description of current applications by: supporting State computer center, on-site processor, or contract support facility.
- Description of current data communications requirements
- Problems

1979



ADP MASTER PLAN

SECTION III: Planned Enhancements to Current Applications

- Description and justification
- Estimated transaction volume change
- Description of reports to be added/deleted
- Estimated effect on current data communications requirements
- Recommendations to State Computer Centers to provide for the planned enhancements

SECTION IV: Planned New Applications

- Description and justification
- Schedule/dates
 1. Development
 2. Test
 3. Operational
- Estimated transaction volume
- Estimated file storage requirements
- Estimated effect on data communications
- Recommendations to supporting computing activity

SECTION V: Resource Requirements

- Personnel
 1. An organization chart of the agency's ADP function showing numbers of personnel by job classification
 2. New requirements that will be requested in next budget request
 3. Special education or training required
 4. Projected requirements (beyond the next budget request) and the estimated fiscal years of the requirements

- Hardware

1. Additional on-site equipment (including terminals) to be requested in the agency's next budget request, and justification
2. Recommended additions that might be budgeted by computer centers for support of the agency (NOTE: No list of current equipment is required if the agency has reviewed and updated the inventory provided by the Division of ADP)

- Software

1. Software required but not available to the agency either on-site or at the supporting computer. Location(s) where the software is required.

- Communications

1. Additional or changing communication lines and modem requirements

- Other Special Requirements

SECTION VI: Benefits

- A description of the benefits, savings, and cost avoidance that are to be realized as a result of implementing this agency plan

SECTION VII: Other Recommendations

- Any specific recommendations to the Division of ADP or supporting computer centers that may improve the agency's ADP function or support of the agency

FORMAT FOR COMPUTER CENTER PLANS

SECTION I: Management Summary

SECTION II: Current Status

- Description of current applications, by agency, that are supported by the center
- Current equipment inventory
- Current utilization (Use illustration as in TAB 3)
- Current data communications schematic(s)
- Problems

SECTION III: Workload

- Applications, by agency, requiring additional support
- Other enhancements required that are not related directly to a specific application; e.g., normal growth, technological change, etc.
- Effect on resources (Use illustration as in TAB 3)

SECTION IV: Short-term (priority) Requirements

- Agencies and their applications that justify the priority

SECTION V: Resource Requirements

- Personnel
 1. An organization chart of the computer center showing the number of personnel by job classification
 2. New requirements that will be requested in next budget request
 3. Special education or training required
- Hardware
 1. Additional equipment (including terminals) to be requested in next budget request, and justification

- Software
 1. Recommended software changes
- Communications
 1. Additional or changing communications lines and modems
- Facilities
 1. Comments on adequacy of existing facilities
 2. Recommended changes
- Other Resources

SECTION VI: Benefits

- A description of specific benefits, savings, and cost avoidance to be sought during the budget year

SECTION VII: Other Recommendations

- Any specific recommendations to the Division of ADP

TAB I

AGENCIES SUBMITTING ADP PLANS

Department of Administration

Division of ADP

Division of Accounts and Controls

Division of Communications

Division of Purchasing

Department of Agriculture

Department of Corrections

Department of Education

Office of the Governor

1979



ADP MASTER PLAN

Department of Health

Department of Highways

Department of Institutions

Department of Labor and Employment - Division of Labor

Department of Law and other Judicial Branch

Legislative Bill Drafting

Department of Local Affairs

Division of Property Taxation

Division of Planning

Division of Criminal Justice

Department of Military Affairs

Department of Personnel

Department of Natural Resources

Department of Regulatory Agencies

Division of Insurance

Department of Social Services

Department of State

Office of State Planning and Budgeting

Department of Treasury

Adams State College

Arapahoe Community College

Colorado School of Mines

1979



ADP MASTER PLAN

Community College of Denver
Fort Lewis College
Lamar Community College
Mesa College
Metropolitan State College
University of Northern Colorado
Otero Community College
Pikes Peak Community College
University of Southern Colorado
Trinidad State Junior College
Western State College

TAB 2

SUPPORTING COMPUTER CENTERS

General Government
Financial Management
Administration of Justice
Labor/Employment
University of Colorado
Colorado State University

TAB 3

HARDWARE UTILIZATION

The current and projected utilization of computer resources should be shown for the current and each future year covered by the plan. Include resource requirements for:

1. Current needs
2. Anticipated growth (volume)
3. New and revised applications

All requirements are measured against existing capacity for each resource shown. Resources should include such components as: CPU cycles, disk storage capability, memory capacity, and channel availability.

The following chart should be completed for each of the five planning or projected years. The chart is an example of the resources which should be included. The resources which should be included will vary depending upon your computer configuration and applications.

FY 19__ - 19__

DESCRIPTION	CPU	MEMORY	DISK ACCESS CHANNEL 1	DISK STORAGE	TAPE ACCESS CHANNEL 2	PRINTER
Current	75	100	80	160	50	50
Growth	10	10	20	30	0	5
New	10	10	10	10	0	5
TOTAL	95	120	110	200	50	60
Capacity	90	90	50	85	50	90
Excess or (Deficiency)	(5)	(30)	(60)	(115)	0	30

Figures are percent of full capacity.

Policy Statement - Public Access to
Public Records

Governor Lamm issued an Executive Order in July, 1978, concerning public access to public records that are stored on computer files. In response to this Executive Order, the attached policy statement was prepared by the Division of ADP. It will be included in the ADP Management Manual.

PUBLIC ACCESS TO PUBLIC RECORDSA. PURPOSE

To incorporate into the State of Colorado Automated Data Processing Management Manual the policy and procedures necessary to implement the Executive Order, dated July 1, 1978 regarding access to public records through the use of computer technology.

B. SCOPE

Distribution made to:

- All Departments
- All ADP Activities
- Archives

C. APPLICABILITY

This Policy Statement is applicable to all State departments, institutions, and agencies.

D. CROSS-REFERENCE

The Executive Order precipitating this Policy Statement is contained in Volume One, Section IV, Page 0200.

E. POLICY

It is the public policy of this State that all public records shall be open for inspection by any person at reasonable times, except as provided in Part 2 of Article 72 of Title 24, C.R.S. 1973 as amended, or as otherwise specifically provided by law.

The executive director of an agency or the official custodian of any public records may make rules and regulations with reference to the inspection of such records as are reasonably necessary for the protection of such records and the prevention of unnecessary interference with the regular discharge of the duties of the custodian or his office.

E. POLICY - (Continued)

The release of any information to the public, supplied through automated processes, shall not take place unless the following events have transpired:

- Written requisition delineating the desired information, records, or data must be received by the official custodian.
- The official custodian must determine if the requested information, record, or data constitutes public record and its disclosure is within the law.
- An appropriate charge must be assessed and reimbursement received from the requesting person. If desired, the official custodian shall provide in writing the basis for such charge.

If the request is denied, the official custodian shall advise the applicant, in writing if desired, the reasons for denial.

When the requested information, record, or data is approved for release by the official custodian the following shall apply:

- Access to State-operated computer through a terminal or other on-line mechanism shall be available only for official State agency use unless special permission is granted by The Director of the Division of Automated Data Processing, the Executive Director of the Department of Administration, and the Executive Director of the principal department or President of an Institution of Higher Education under whose jurisdiction the information, records, or data reside.
- All data resulting from the activities of an agency using ADP equipment is considered private data of that agency. Use and dissemination of this data by computer center personnel is absolutely prohibited without proper authority being given. The appropriate Executive Director or the official custodian must provide written authority to the computer facility director prior to any data within the facility director's jurisdiction being released in any manner to any individual, government agency, or private concern. It is the facility director's responsibility to adopt adequate safeguards to protect data stored within the facility.

E. POLICY - (Continued)

- Without proper approval, no equipment or personnel will be acquired for the purpose of supporting requests from special interest groups nor will personnel or equipment be dedicated for this purpose. Existing computer routines will be used and the development of special routines to support requests is to be discouraged.
- Data shall not be created or maintained for the purpose of solely fulfilling requests from special interest groups, individuals, or any concern other than official State business.
- The conducting of State business will take precedence over satisfying any outside request.
- Accuracy of data provided may be subject to error and shall not be guaranteed. The State shall not be liable for any cost, loss, or damage resulting from furnishing inaccurate data.
- The Executive Director or official custodian to whom requests are submitted must ensure that the applicants for data are notified of all restrictions that apply to the use of data to be supplied. Violations of the law, policy statements, or the restrictions regarding misuse will be reported to the Attorney General.
- Recipients of requested data must agree in writing to assume liability for misuse of such information. Data shall not be subsequently resold in any form.

The State shall provide for the exchange of data and information, with due consideration of confidentiality, privacy, security, and benefits, among State agencies and between State agencies and federal and local governments.

F. PROCEDURE

It shall be the responsibility of each department, agency, or institution to establish procedures describing actions needed in fulfilling information requests from the public sector. These procedures shall satisfy the intent of the law, Executive Orders, policy statements, and rules established to govern the dissemination of computerized information to the public.

Each director or manager of an automated data processing facility, that retains or stores automated data files, will obtain and retain a written document, from each custodian, containing enough information on each system to be able to determine and provide sufficient security against unauthorized access to private data.

It is also the responsibility of each ADP director or manager to develop, document, implement and enforce internal procedures as necessary to insure that appropriate security measures are being taken and appropriate monitoring of the system is being conducted to avoid unauthorized access and to detect attempts of access to unauthorized data.

Purpose, Scope and Objectives of Statewide Data Communications Plan

This document formulates the purpose, scope, and objectives of the Statewide Data Communications Plan that will be developed by a Task Force during 1979.

1979



ADP MASTER PLAN

PURPOSE, SCOPE AND OBJECTIVES OF STATEWIDE DATA COMMUNICATIONS PLAN

PURPOSE

The purpose of a statewide data communication plan is to examine data processing and data base requirements as related to network structure and determine if certain statewide networking design techniques could facilitate a more versatile, cost-effective statewide data communication network. The results of such a plan will provide the guidelines for State agencies and institutions of higher education in preparation of their data communications planning and budgeting activities.

SCOPE

The data communication plan will examine processing and data base requirements, current and future data circuit structure and utilization, network requirements, centralized vs. distributed processing, distributed processing techniques, networking techniques, network processors, communications network software, terminal equipment, concentration equipment and bulk acquisition of data circuits. These factors will be assimilated, alternatives determined, cost estimated and recommendations proposed.

OBJECTIVES

The Statewide Data Communication Plan is projected for completion by the end of Fiscal Year 1979-80. A large amount of preparatory research and data collection activities are required in the completion of this plan and for these reasons the long duration of preparation time is required.

In completing this plan a number of objectives have been defined for guidance to the Task Force in the collection of information, the evaluation of networking techniques available, the preparation of alternatives and in the determination of recommendations. These objectives are:

1. Determine the best method in which a statewide network service could be provided to the many on-line users, allowing them to access other computer centers when required, but at the same time reducing the redundancy of communication facilities.

2. Evaluate State agencies and institutions of higher education data processing and data base requirements and determine which computer centers need to be accessed by which State agency or institution. Also, examine distributed processing vs. centralized processing.
3. Examine distributed processing techniques available from the various vendors and recommend the techniques that will best serve the various State agencies problems.
4. Study current and future network requirements associated with each State computer center in order to gain a full understanding of total network requirements.
5. Examine networking techniques available from the various equipment vendors and common carriers and present the more practical alternatives.
6. Evaluate network requirements as related to bulk acquisition of data circuits in order to take advantage of reduced rates associated with these types of circuits.
7. Determine the type of terminal equipment configurations that could best provide effective processing associated with data processing and data base requirements.
8. Examine concentrators, multiplexing, switching and other related equipment techniques, that would facilitate effective networking.
9. Analyze the capability and limitations of network processors and how they could be best utilized to support a statewide network service.
10. Examine software requirements and software packages that could support a statewide communication network.

Computer Center Data Processing Service Agreement

The Administration of Justice Data Processing Service Agreement between the Administration of Justice Computer Center and Department of Corrections is an example of the type of service agreement that may be made between a computer center and its user agencies.

1979



ADP MASTER PLAN

11-7
ADMINISTRATION OF JUSTICE
COMPUTER CENTER
DATA PROCESSING SERVICE AGREEMENT

PURPOSE:

This ADP Support Agreement between the Department of Local Affairs, hereinafter referred to as Local Affairs, and the Department of Corrections, hereinafter referred to as Corrections, shall become effective immediately upon signature by both parties and the approval of the Division of Automated Data Processing, Department of Administration, hereinafter referred to as the Division of ADP.

The purpose of this Agreement is to provide continuing Automated Data Processing support to Corrections from the Administration of Justice Computer Center, which functions under the management control of Local Affairs. Such ADP support will be in those functional areas deemed by the Division of ADP to fall within the mission of the Administration of Justice Computer Center.

TERM OF AGREEMENT:

This Agreement may be amended, supplemented, or modified at any time. Such actions must be approved by all parties approving this, the original Agreement. The term of this original Agreement shall be from time of approval through fiscal year 1978-79 (through June 30, 1979). This Agreement may be extended in yearly increments beyond June 30, by agreement of all parties concerned. Extensions can be in letter form.

MISSION:

The Administration of Justice Computer Center has been established to provide ADP services for the Colorado Bureau of Investigation, Department of Local Affairs and Corrections. The Center will be operated in accordance with the generally accepted definition of a computer facility. The Center will provide computer hardware and systems software, facilities and operations management, and other generalized software packages as required to serve users.

Development of applications systems and programs shall be the responsibility of requiring users. However, the Center will provide technical assistance upon request, within available resources. Availability of such resources shall be the decision of the Center's management.

CONTROL:

The Center will operate under the responsibility and general direction of the Director of the Department of Local Affairs and the Center Manager. There will be a Policy Board established to provide advice to the Director in the Center's operations. This Board will not usurp the authority and functions of the CCIC Policy Advisory Board. Corrections will be afforded representation on the Policy Board.

CENTER MANAGEMENT:

The Center Manager will be responsible to the Director of the CBI for operation of the central facility in such manner as to provide each user the advantages of ownership of its own computer. With respect to systems software and programming, the Center Manager will be responsible for maintaining a computer operating system and supporting software adequate to the needs of all users consistent with the efficient and economic use of available funds, personnel and other ADP resources. He shall also maintain the applications library.

Local Affairs and Corrections are authorized to develop and implement procedures and policy to govern day-to-day working arrangements, reporting procedures, liaison and other required procedures to insure satisfactory ADP support.

STAFFING:

The Center Manager will provide personnel as are required to accomplish the tasks related to the mission of the Center. Such tasks will include, but not be limited to, (1) administration of the Center (2) operation of the hardware, including the central computer and peripheral hardware associated with the computer (3) general purpose software evaluation and development necessary to service the user institutions/agencies (4) input-output scheduling functions (5) the librarian function for tape and disk cataloging, storage and security (6) application development and maintenance personnel to support the CBI. Corrections will provide for Data Creation personnel and Systems Development and Maintenance personnel.

Corrections or the Division of ADP will provide four (4) FTE's, and the associated funding, to augment CBI staff and assist with the above listed functions. These staff will be reallocated from the Department of Institutions' ADP Center, to the extent that new FTE's are appropriated to the Department of Corrections for ADP support in FY 1978-79 in excess of the four currently appropriated to the Department of Institutions, or they will be reallocated from other agencies by the Division of ADP. Four new FTE's have been requested by Corrections.

SYSTEMS SUPPORT:

Responsibility for systems development and maintenance rests with the Center. All systems development work (and programming) done by Corrections technicians will be coordinated with the CBI technical staff to insure compliance with protocol, systems software, data bases and possible technical limitations. Prescribed documentation standards will be adhered to. Back up support requirements will be referred to the Center Manager. In general, the user shall be responsible for the development and maintenance of its applications systems and the input to those systems. The Center Manager will be responsible for the process and throughput.

PRIORITIES:

Corrections will be afforded equal priority with other on-line, realtime Administration of Justice Applications. Access to Criminal Justice files will be determined mutually. The Center Manager shall develop work schedules and coordinate the operations and services of the Center within established policies. Any operational conflicts resulting from differences in the requirements of users shall be resolved by the Executive Director, Local Affairs or referred to the Division of ADP for resolution, in that order.

ADP HARDWARE:

The Computer System and all related peripherals installed in the Administration of Justice Computer Center will be budgeted for by Local Affairs (CBI). The budget narrative will attempt to show anticipated usage, by agency (i.e. CBI = 60%, State Patrol = 20%, STEP = 5%, Corrections = 15%). Predictions of use, at best, are empirical. Such predictions will be coordinated with the agencies concerned. The Center must retain a fully operational posture. To charge individual items of hardware to the using agencies could jeopardize the capability of the Center to function efficiently. Contracts for center hardware will be entered in to by Local Affairs.

Costs of dedicated Corrections ADP hardware external to the Administration of Justice Computer Center will be borne by Corrections. The associated contracts, budgeting, maintenance and management will also rest with Corrections. The addition of external ADP hardware to the Administration of Justice Computer Center must first be coordinated with Local Affairs. Acquisition of hardware must always be approved by the Division of ADP.

COMMUNICATIONS:

The addition of dedicated communications circuits will be requested (in writing) by Corrections to Local Affairs (CBI) who, in turn, will initiate the order for such circuit(s). The cost will be borne by Corrections.

BUDGETING:

The budgets for both Local Affairs (CBI) and Corrections have already been submitted for fiscal year 1978-79. Corrections will reimburse Local Affairs (CBI) thirty-nine thousand dollars (\$39,000) for additional hardware costs required by the Center during this fiscal period. Future budgets (1979-80 and beyond) will include all center hardware in the Local Affairs budget. From 1979-80 forward, users (including Corrections) will receive memorandum billings based on a computerized accounting system.

SECURITY:

The Center Manager will establish and provide procedures in the areas of security, protective measures, hardware and software back-up, data back-up, and recovery methods pertinent to operation of the Computer Center.

Master files physically housed at the Center will be accorded appropriate security including providing duplicate copies on magnetic tape for storage at user agencies or other safe locations away from the Computer Center.

CONVERSION TO THE UNIVAC 1100/82:

The Corrections applications will be converted (or developed) to run on the UNIVAC 1100/82 scheduled for installation in the CBI. This conversion will be accomplished utilizing UNIVAC labor (2 man years) and Corrections labor as may be mutually arranged between Corrections and UNIVAC. The conversion effort will be supervised by UNIVAC and the Local Affairs CBI project leaders. Periodic progress reports will be rendered to both Corrections and Local Affairs. Corrections will designate a coordinator to work with the conversion team.

USE LIMITATIONS:

This Agreement places no use limitations on the Department of Corrections. All ADP applications supported by the Administration of Justice Computer Center must first be approved by the Division of ADP. All actual use, as recorded and costed by the Computerized Accounting System after July 1, 1979, must approximate budgeted amounts. Use of the Computer Center's resources in excess of budgeted amounts will be paid for by Corrections. Corrections must defend their own use requirements in the budgetary process.

DIVISION OF ADP:

The Director of the Division of ADP is responsible for administering the State's ADP in accordance with an approved plan. The responsibilities of the DADP and its Director are specifically enumerated in Article 3-26 of the State of Colorado Revised Statutes.


In accordance with the statutes and relative to this Agreement the Division of ADP will:

- Be a party to the Agreement and any amendments or additions thereto.
- Ensure that this Agreement (as amended) is in accordance with the approved plan for State ADP, and recommend to the Governor such changes to the plan as may be required which may be discovered by operating within this Agreement.
- Act as approving authority for new data processing hardware or systems software acquisition, and for any ADP services contracts required to supplement the Center's and/or user's capabilities or capacities.
- Resolve situations which cannot be agreed upon among the Center Director, any user agency and the Center's Policy Board.

- Recommend the transfer of funds, equipment, supplies, and personnel from existing agencies to the Division of ADP or to such other agency as may be necessary. (Article 3-26-4.g, Col Rev Stat).
- Provide for and chair a Statewide advisory committee representing several Centers and users to assist in establishing Statewide standards, procedures and in-service training and for coordinating the exchange of information across agency lines and for statewide purposes.
- Publish such standards and procedures as necessary.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the day specified hereafter in writing.

DEPARTMENT OF LOCAL AFFAIRS



Executive Director


DEPARTMENT OF CORRECTIONS



Executive Director

Approved by:

DIVISION OF ADP

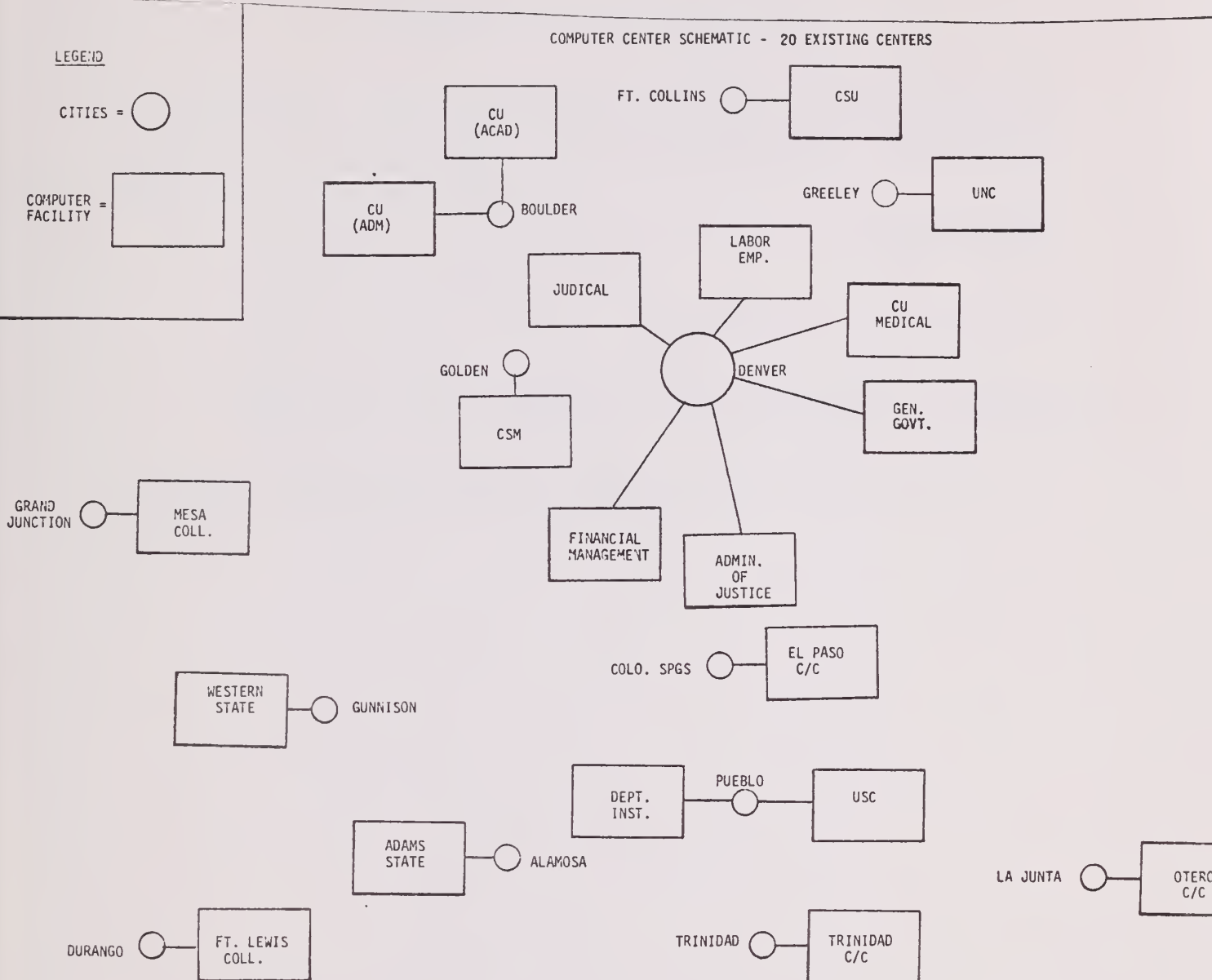


Acting Director of ADP

Date: MARCH 17 1978

Computer Center Schematic - 20 Existing Centers

This schematic depicts the existing twenty computer centers. The Department of Social Services Computer Center has been merged into the General Government Computer Center. This plan recommends that the Judicial Computer Center be merged into the General Government Computer Center during 1979.



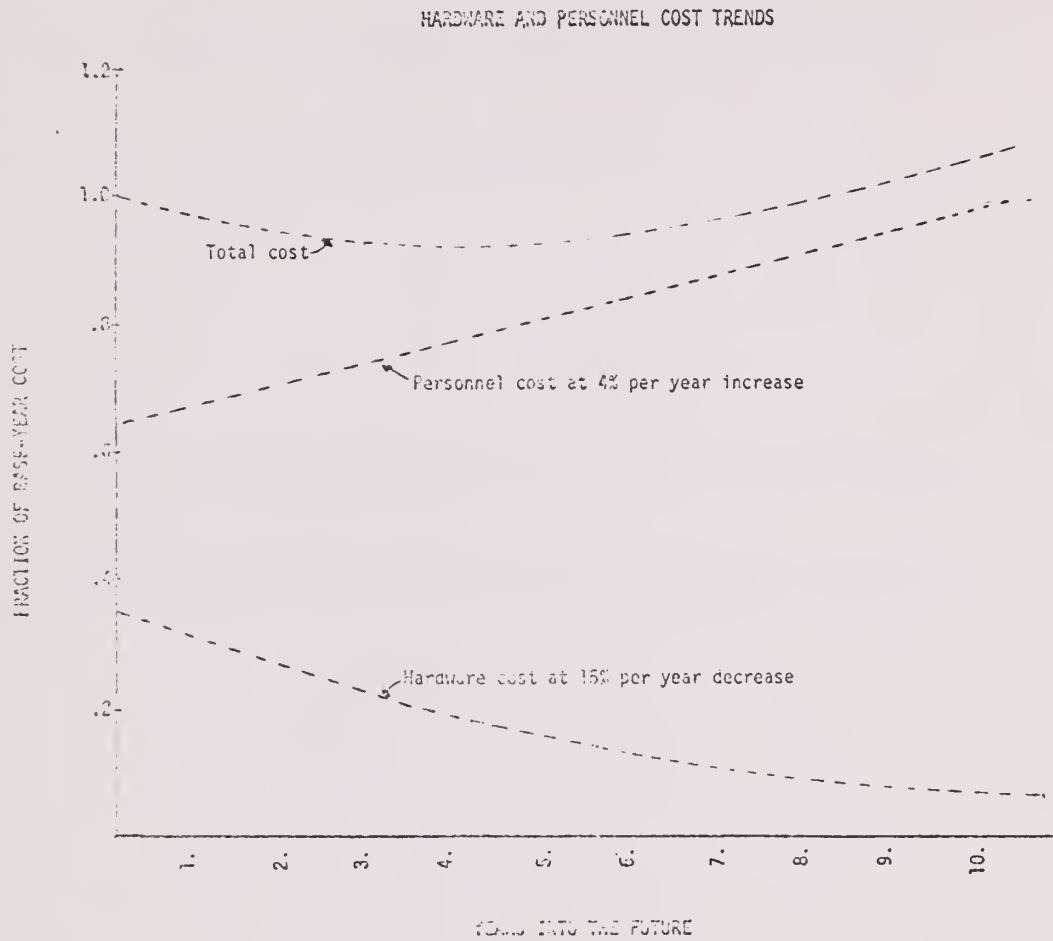
Hardware and Personnel Cost Trends

Technological advances are resulting in significant decreases in the cost of hardware. The cost of hardware required to perform a given set of tasks will continue to decline both in absolute terms and especially as related to personnel costs. This Exhibit represents a simple extrapolation of current national trends of:

- A computer centers current costs are one third hardware related and two thirds personnel related.
- Hardware costs will decline at an average rate of 15% per year.
- Personnel-related costs will increase at an average rate of 4% per year. (This projection assumes improvement in productivity to partially offset inflationary increases in salaries and benefits.)

Thus, it becomes apparent that hardware costs become less and less significant and personnel costs increase steadily.¹

¹ James C. Emery, "The Coming Challenge on Campus Computation," Educom Bulletin, Spring 1978, p. 20-21)



Computer Center Cost Allocation

This Exhibit is an illustration of the form on which a computer center shall calculate its billing rates and obtain the approval of the Division of ADP.

Cost Centers will be established as follows:

- Systems Analysis
- Programming
- Data Entry
- Computer
- Others (as appropriate to an individual center as approved by the Division of ADP)

All indirect as well as direct costs for the operation of a cost center will be recovered through the use of a standard charging algorithm.

STATE OF COLORADO
STATE COMPUTER CENTER XXXXXXXXX
DIRECT AND INDIRECT COST ALLOCATION

LINE #	DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11
		APPROPRIATION TOTAL COST	ADMINISTRATION (MANAGEMENT)	MANAGER	SYSTEMS ANALYSTS	PROGRAMMER	SOFTWARE PROGRAMMING (SYSTEM SOFTWARE)	MANAGER	DATA ENTRY	COMPUTER OPERATION	DIRECT CHARGE DEDICATED USER	ALLOCATION BASIS
1	PLANNED # OF EMPLOYEES (FTE)											
2	PERSONAL SERVICES	50	2	1	5	6	2	1	20	13		
3	Salaries, PERA	595,000	35,000	25,000	100,000	100,000	40,000	25,000	140,000	130,000		
4	Fringe Benefits (POTS)	29,750	1,750	1,250	5,000	5,000	2,000	1,250	7,000	6,500		
5	(Non-Appropriated)											
6	TOTAL PERSONAL SERVICES	624,750	36,750	26,250	105,000	105,000	42,000	26,250	147,000	136,500		
7	OPERATING EXPENSE											
8	Office Supplies	2,000	100	900				900	5,000	45,000		
9	Computer Supplies	50,000							11,000	69,000		
10	Equipment Rent	81,000							1,000	7,000		
11	Equipment Maintenance	8,200						100		5,000		
12	Training	1,000		800				100		400		
13	Software	5,000	500	200				100	100			
14	Travel	1,000	100	300								
15	Other Operating Expense	1,000										
16	CAPITAL OUTLAY*											
17	Office Furniture	500		400				100		100,000		
18	Computer Equipment	109,000								1,000		
19	Vehicle	1,000										
20	TOTAL COSTS	875,450	37,450	28,850	105,000	105,000	42,500	27,450	164,100	363,900	1,200	
21	ALLOCATION OF OVERHEAD COSTS TO COST CENTERS											
22	Administration Costs		(37,450)	9,360	17,370	20,840	1,560	26,530				
23	Development Mgr. Overhead			(38,210)			(44,060)					
24	Software Support											
25	Operation Mgr. Overhead											
26	TOTAL COST CENTER COSTS	875,450	0	0	122,370	125,840	0	(53,980)	16,840	44,060		
27	ESTIMATED BILLABLE UNITS OF WORK (SCHEDULE #2)				7,875	9,450			33,000	(See Schedule 3)		
28	ESTIMATED HOURLY BILLING RATE				15.54	13.32			5.48			
29	NON-RECOVERABLE APPROPRIATION (difference between annual cost of capital items and amount used because of amortization)	40,000										
30	TOTAL APPROPRIATION	915,450										

*Actual Cost or depreciation amount if equipment is being amortized.

Number of FTE
Number of FTE
Dir. Supp. Funct.
% of Total Direct Cost

(See Schedule 3)

Major Planned Activities Implementation Diagram

This chart depicts a proposed schedule for implementing the 1979 Master Plan recommendations and activities over the next 3 1/2 years.

MAJOR PLANNED ACTIVITIES IMPLEMENTATION DIAGRAM

ACTIVITIES	Jan. '79	July '79	Jan. '80	July '80	Jan. '81	July '81	Jan. '82	July '82
- Conversion of Corrections Applications for Processing on AJCC Computer Systems	-----X							
- Transfer of Dept. of Corrections Applications to AJCC		X						
- Transfer of Judicial Branch Applications to GGCC		X---X						
- Conversion of Judicial Applications from DOS to OS		X	-----X					
- Establish Financial Management Computer Center		X	-----X			X		
- Provide Final Life Cycle Outfitting of GGCC and FMCC		X	-----X		X			
- Obtain Uninterruptable Power Supply System to Serve GGCC and AJCC		X	-----X					
- Study and Determine Specific Higher Education Administrative Applications for Common Development - Begin Implementation		X	-----X					X
- Implement Decisions resulting from Higher Education Consortium Study		X	-----X					X
- Develop and Implement Data Communications Master Plan		X	-----X				X	

1979

STATE OF
COLORADO

ADP MASTER PLAN

